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PATENT SPECIFICATION

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Inventor: JOHN HENRY HOUGHTON.

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COMPLETE SPECIFICATION

DRAWINGS ATTACHED

Improvements in Three-Way Buckets or Skips on Tractors

- WE, T. T. BROUGHTON & SONS LIMITED, a British Company of Amersham Common, Buckinghamshire, do hereby declare the invention, for which we pray that a Patent may be granted to us and the method by which it is to be performed, to be particularly described in and by the following statement:—
- This invention relates to three-way buckets, or skips as used on tractors for loading and unloading operations in which the bucket or skip is carried by the free end of a beam adapted to be swung up and down relative to the tractor by a hydraulic jack or other suitable power actuated means, and in which, in association with the beam, is provided a hydraulic jack connected by a link to the cradle for the bucket or skip, whereby when such hydraulic jack is energised the bucket or skip is tilted about a pivotal connection of the cradle to the beam through the desired angle for engaging the bucket or skip with a load to be lifted, and thereupon returned by actuation of such hydraulic jack to a "raised" position so that it will retain therein the material gathered by the bucket or skip, and subsequently tilted in a direction substantially transverse to the forward direction of tilt for discharging its load alongside the part of the site occupied by the tractor.
- In the present invention, the bucket or skip, when discharging its load is so supported and actuated that it may be tilted laterally relative to the cradle to which it is pivotally connected, this lateral tilting being either side of the cradle under the control of the driver of the tractor. In one arrangement of the present invention such lateral tilting may be about two separate axes normal to the axis of forward and upward tilt of the bucket or skip, but desirably, such lateral tilting is about axes which converge forwardly, whereby the bucket or skip may discharge its load close alongside the site occupied by the tractor, it being understood that the axes of lateral tilt are selected by the driver of the tractor.
- According to the present invention, a three-way tiltable bucket or skip, comprises a cradle carrying the bucket or skip and pivotally connected to a beam for forward and return tilting of the bucket or skip, a remote controlled first jack to effect such tilting, a remote controlled second jack for applying lateral tilt to the bucket or skip relative to the cradle about two selectable lateral axes, remote control means to free the bucket or skip from pivotal connection to the cradle about one of said axes whilst retaining the pivotal connection for tilting about the other of said axes, said control means being common to both of said lateral axes and comprising a single fluid pressure actuated driver, means actuated by said driver to retain the selected pivotal connection and simultaneously free the other pivotal connection of the bucket or skip to the cradle, the said pivotal connections comprising disengageable mating pivot-forming members on the bucket or skip and on the cradle, and the said retaining means comprising members displaceable relative to and co-operating with said mating pivot-forming members to prevent their separation when selected to afford the pivot axis for the lateral tilting of the bucket or skip.
- Further, in accordance with the present invention, a three-way tiltable bucket or skip comprises a cradle having a pivotal con-

[P. 1]

nection to a beam, remote control jack means for tilting said cradle about the axis of its pivotal connection to the beam, the said cradle being provided adjacent to each lateral side thereof with brackets, slots in said brackets, each open at one end to receive and pivotally support a respective one of journal pins carried by the bucket or skip, a fluid actuated driver carried by the cradle and operatively connected to a locking plate selectively engageable with the slots of the two sets of brackets to retain, when engaged in one set of slots, the pivot pins carried by the bucket on one side of the base of the bucket and to be disengaged from the slots of the other brackets, a hydraulic jack being pivoted to the said cradle and to the bucket or skip so that when energised it will tilt the bucket or skip about the axis appropriate to the slotted brackets in which the pivot pins are secured by the said locking means, the said hydraulic jack, when in the normal or retracted condition, serving as the means to anchor the bucket or skip to the said cradle when the bucket or skip is to be tilted forwardly relative to said beam.

In order that the present invention may be understood and readily be carried into effect, drawings are appended herewith illustrating an embodiment thereof, and wherein,

Figure 1 is a front elevation view of the bucket or skip when in its normal relationship with the cradle supporting it, the lateral tilting of the bucket or skip being shown in broken lines.

Figure 2 is a plan view of the cradle and locking means, showing the locking means set in a position for tilting the bucket or skip laterally to the left of the Figure.

Figure 3 is a front elevation view of Figure 2.

Figure 4 is a side elevation view of Figure 2.

Figure 5 is a front view to a larger scale of the bucket or skip separated from its cradle.

Figure 6 is a side elevation view of Figure 1, and

Figure 7 is a broken detail perspective view showing one of the pivot connections of the bucket separated from the cradle.

Referring to the drawings, the bucket or skip 1, hereinafter referred to as the bucket, as may be seen from Figures 1 and 6, is a hopper shaped body, that is to say it has upwardly diverging fore and aft walls 2 and 3 respectively and upwardly diverging symmetrical side walls 4 and 5, the fore and aft walls merging into an arcuately dished base 6 (see Figure 6). The upper marginal part of the front wall 2 is provided with a hardened steel bar 7, and the rear wall 3 is formed with an upstanding flange 8 to

prevent spilling of the contents of the bucket over the rear of the bucket.

Welded to the side walls of the bucket at the lower parts thereof are a pair of plates 9 and 10, to each of which are welded two pairs of lugs, the two sets of lugs for the plates 9 and 10 being indicated by the reference numerals 9a, 9b, and 10a, 10b respectively.

The latter mentioned lugs project downwardly beyond the base of the bucket and are formed with apertured bosses 11, the bosses of each pair of lugs receiving the respective one of four pivot pins 12 (see Figure 7), such pivot pins seating in the semicircular lower ends of vertical slots 13 formed in four pivot brackets 14 in the form of rectangular metal bosses welded to a cradle plate 15, whereby when the bucket is in normal or idle condition, it may be regarded as supported by four pivot pins in bifurcated brackets secured to the cradle 15, and the bucket is held in a position with its vertical axis substantially normal to the cradle 15 by a hydraulic jack 16 pivoted at one end to a pivot pin 17 secured across a parallel pair of plates 18 and 19 welded at their ends to a pair of side webs 20, the upper edges of which converge downwardly into the plane of the cradle plate 15, and at its other end the jack 16 is pivotally connected to a pivot pin 21 secured across a pair of lugs of a bracket 22 welded to the rear of the bucket 2 at the upper end thereof.

The cradle plate 15 is formed with two pairs of depending lugs 23 which receive the ends of a pair of pivot bolts for sleeves 24, carried by the upper ends of the side arms 25 comprising the free or normally upper end of a beam, which at its lower end is suitably pivoted to a supporting structure on the tractor, this beam being raised and lowered about its lower pivotal axis by a hydraulic jack, the piston rod of which is indicated by the reference numeral 26 in Figure 6. Adjacent its rear edge the cradle 15 is formed with further lugs 27 to which is pivoted the upper end of a link or pair of link 28 pivoted at their lower ends to a rocker arm 29 adapted to be rocked relative to the beam 26 by a hydraulic jack 30.

It will be appreciated from the foregoing that so long as the hydraulic jack 16 is in the retracted condition shown in Figure 6, energising of the hydraulic jack 30 so as to extend its effective length will rock the cradle plate 15 about its pivotal connection to the beam 25 so as to tilt the bucket forwardly relative to the cradle, e.g. as when engaging the bucket with material at ground level to scoop up a quantity of material, and subsequently, by further actuation of the hydraulic jack 30 to reduce its effective length the bucket will be restored to the

position when its vertical axis is substantially normal to the plane of the cradle 15.

The aforesaid forward and backward tilting of the bucket 15 is a well known expedient, as also is the expedient of tilting the bucket about separate side axes so as to incline it laterally either side of the cradle 15. This lateral tilting of the bucket 1 is effected by energising the hydraulic jack 16 so as to increase its effective length, and provided the pair of pins 12 on one side of the base of the bucket are prevented from being disengaged from the slots 13, and the other pair of bolts 15 are free to be disengaged from the associated pair of slots 13 in the respective brackets 14, it will be apparent that as the axis of the hydraulic jack 16 is in a vertical plane which is midway between the side walls 4 and 5 of the bucket, such extension of the hydraulic jack 16 will cause the bucket to swing about the common axis of the pivot pins 12 which are prevented from being disengaged from the slots 13 on the appropriate pair of brackets 14. That is to say, the bucket is provided just beneath its base along both sides 4 and 5, and suitable locking means is provided to selectively release one side of the bucket for being raised relative to the pivot axis on the opposite side, this locking means also providing for complete disengagement of the pivot pins 12 from the brackets 14 when the bucket is being tilted fore and aft relative to the cradle 15.

The said locking means is operated by a single hydraulic plunger device comprising a cylinder 31 secured at its ends to the inner ends of the aforesaid webs 20, and having a piston actuated by the selection of a pair of flexible pipes 32 and 33 for connection in the one case to the source of supply of hydraulic fluid and in the other case to the return side for the hydraulic fluid, this selection being by any suitable remote control valve accessible to the drive of the tractor. The rod 34 of the piston extends through both ends of the cylinder and at its ends it is secured to a pair of side arms of a locking plate 36 having at each end a pair of locking bars 37 aligned with horizontal slots 38 in the limbs of the bifurcated upper parts of the brackets 14. As will be seen by reference to Figures 2 and 3 of the drawings, only one pair of locking bars 37 are engaged in the slots 38 of a pair of brackets 14 on one side of the cradle 15 and will form positive stops against the disengagement from the slots 13 of the brackets 14 of the pair of pivot pins 12 engaged in such pair of brackets, the pivot pins 12 engaged in the other pair of brackets being free to move out from the slots 13 by reason of the opposed pair of locking bars 37 being completely disengaged from the associated brackets 14.

The pivot axes of the pivot pins 12 on one side of the cradle 15 may be parallel with the pivot axes of the other pair of pivot pins 12, it being understood that correspondingly the slots 13 of the brackets will likewise be parallel, whereby the bucket will be tilted laterally in the selected direction which will be normal to the forward direction of tilting of the bucket. However, it is preferred to converge the axes of the pivot pins 12 forwardly as shown in the broken lines 39 in Figure 2, whereby the bucket, when tilted laterally will discharge its contents forwardly alongside the tractor.

When employing the latter mentioned arrangement of converging pivot axes for the bucket, the hydraulic jack 16 will have a limited universal pivotal connection of its cylinder to the pivot pins 17, and likewise, its piston rod will have a universal connection to the bracket 22 at the upper end of the bucket or skip, such form of limited universal connection being shown in Figure 2 for the lower end of the cylinder.

The use of a single hydraulic plunger device 31 for selectively locking the pivotal connections of the bucket to the cradle 15 has the advantage of obviating the necessity of separate hydraulic plunger devices for each pivot axis, with the consequent saving in hydraulic pipelines.

It will be understood that the valve means for controlling the actuation of the bucket or skip will be such as to prevent actuation of the hydraulic jack 16 when the beam 25 is under actuation of its jack 30 during engagement of the bucket with the material to be dislodged or scooped up thereby, whilst at the same time actuation of the plunger member 31 to free the pivot pins 12 from the bifurcated lugs 14 would also be prevented pending returning the bucket or skip to a desired raised position and the retraction of the hydraulic jack 16. Should it be desired to rock the bucket or skip relative to the cradle, e.g. for loosening material therein, the plunger device 31 may be adapted to occupy a neutral position at which the hydraulic fluid pressure is balanced on opposite sides of the piston with all four locking members 37 disengaged from the slots 13 and the jack 16 used for such rocking action.

WHAT WE CLAIM IS:—

1. A three-way tiltable bucket or skip, comprising a cradle carrying the bucket or skip and pivotally connected to a beam for upward and return tilting movement of the bucket or skip, a remote controlled first jack to effect such tilting, a remote controlled second jack for applying the lateral tilt to the bucket or skip relative to the cradle about two selectable lateral axes, remote control means to free the bucket or skip from pivotal connection to the cradle

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about one of said axes whilst retaining the pivotal connection for tilting about the other of said axes, said control means being common to both of said lateral axes and comprising a single fluid pressure actuated driver, means actuated by said driver to retain the selected pivotal connection and simultaneously free the other pivotal connection of the bucket or skip to the cradle, the said pivotal connections comprising disengageable mating pivot-forming members on the bucket or skip and on the cradle, and the said retaining means comprising members displaceable relative to tilt and co-operating with said mating pivot-forming members to prevent their separation when selected to afford the pivot axis for the lateral tilting of the bucket or skip.

2. A three-way tiltably supported bucket or skip on a tractor, and tiltable relative to a beam of the tractor selectively about a first axis for fore and aft tilt and for lateral tilt opposite sides of the beam about lateral axes, comprising a cradle upon which the bucket or skip is carried, said cradle being pivoted about said first axis to the beam, remote control power actuated means for tilting the cradle with the bucket about said first axis, complementary inter-engaging pivot-forming members on each lateral side of the cradle and bucket or skip affording pivot axes about which the bucket or skip may be tilted selectively relative to opposite lateral sides of the cradle, means to lock against separation the inter-engaging pivot-forming members, a remote controlled power actuated member common to, and so operating said locking means, that said locking is effective only on the selected lateral side of pivotal axis, and a power actuated member to apply tilt to the bucket to either direction of lateral tilt.

3. A three-way tiltably supported bucket on a tractor and tiltable relative to a beam on the tractor, comprising a cradle having a pivotal connection to such beam, remote control jack means for tilting said cradle about the axis of its pivotal connection to the beam, the said cradle being provided adjacent each lateral side thereof with brackets, slots in said brackets each open at one end to receive and pivotally support a respective one of pivot pins carried by the bucket or skip, a fluid pressure actuated driver carried by the cradle and operatively connected to a locking plate selectively engageable with the slot of the two sets of brackets to retain, when engaged in one of said set of slots, the pivot pins carried by the bucket on one side of the base of the bucket and to be disengaged from the slots of the other bracket, a hydraulic jack pivoted to the said cradle and to the bucket or skip so that when energised it will tilt the bucket or skip about the axis appropri-

ate to the slotted brackets in which the pivot pins are secured by the said locking means, the said hydraulic jack, when in the normal or retracted condition, serving as the means to anchor the bucket or skip to the said cradle when the bucket or skip is to be tilted forwardly relative to the said beam.

4. A three-way tiltably supported bucket or skip as claimed in Claim 1, Claim 2 or Claim 3, wherein the cradle has slidably supported thereon a locking plate for effecting retention of the bucket or skip pivotally to one lateral side of the cradle whilst freeing the bucket or skip from pivotal retention at the opposite lateral side of the cradle, a hydraulic fluid pressure actuator being carried by the cradle to selectively displace the locking plate in opposite directions to effect the selection of lateral pivotal axis of the bucket or skip.

5. A three-way tiltably supported bucket or skip, as claimed in Claims 3 and 4, wherein said locking plate is provided at opposite lateral sides with locking bars, and wherein said brackets are bifurcated to form said slots receiving said pivot pins, upper end parts of the limbs of the bifurcated brackets being formed with transverse slots aligned with and adapted to receive the said locking bars.

6. A three-way tiltably supported bucket or skip as claimed in Claim 5, wherein said locking plate is formed at each lateral side with two fore and aft spaced locking bars, and wherein said bifurcated brackets comprise a pair adjacent one side of the cradle, and a further pair adjacent the other side of the cradle, the base of the bucket having two sets of depending lugs adjacent opposite lateral sides thereof and carrying relatively transverse pivot pins to seat in the bases of the bifurcation slots of the brackets beneath the locking bar receiving slots in the said limbs of the brackets.

7. A three-way tiltably supported bucket or skip as claimed in Claim 3, Claim 4 or Claim 5, wherein the locking plate is shaped to receive between its lateral side parts the fluid pressure actuated driver therefor, and is secured to a piston rod of said driver.

8. A three-way tiltably supported bucket or skip as claimed in any of the preceding Claims, wherein the bucket or skip and the cradle have the fluid pressure actuated jack for tilting the bucket or skip laterally relative to the cradle disposed normally in a plane normal to the plane containing both of the pivotal axes of lateral tilt and midway between said axes, one end of such jack being pivoted to the rear part of the cradle and the other end to the upper part of the rear of the bucket.

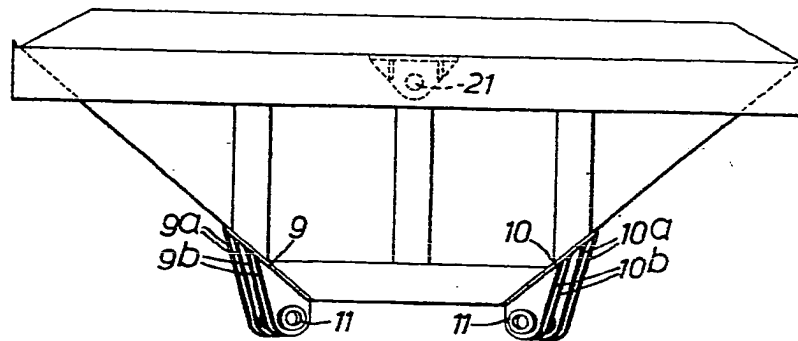
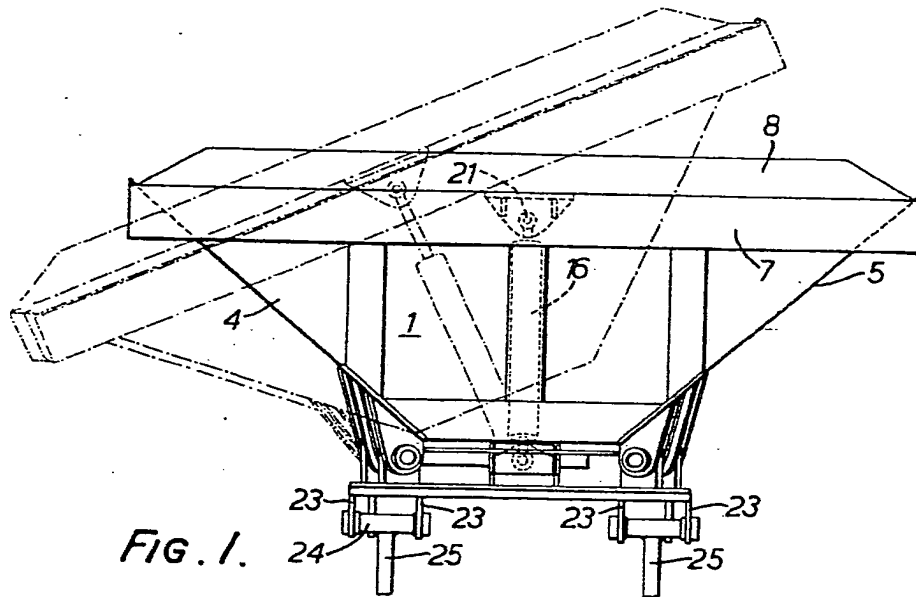
9. A three-way tiltably supported bucket or skip according to any of the preceding

Claims wherein the pivot axes for lateral tilting of the bucket or skip converge forwardly.

10. A three-way tiltably supported
5 bucket or skip, substantially as hereinbefore described with reference to and as illustrated by the accompanying drawings.

For the Applicants,
G. F. REDFERN & CO.,
St. Martin's House,
177 Preston Road, Brighton, Sussex.
and
Bank Chambers, 329 High Holborn,
London, W.C.1.

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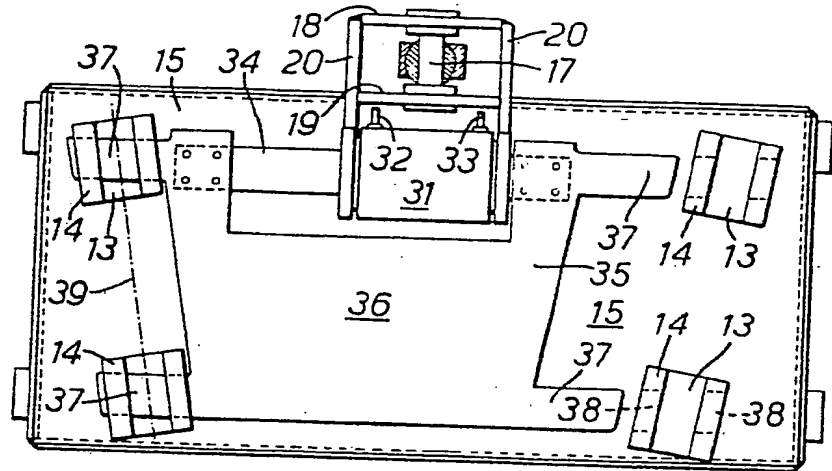


FIG. 2.

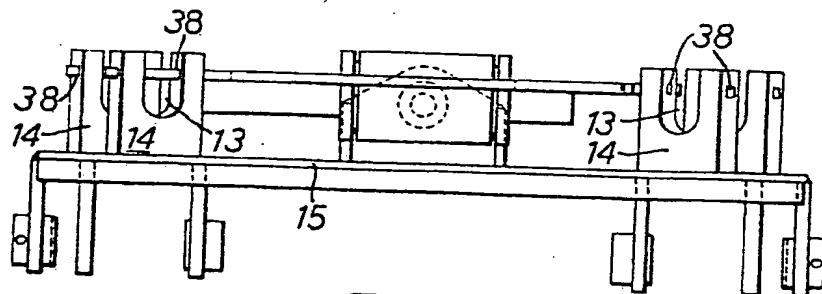


FIG. 3.

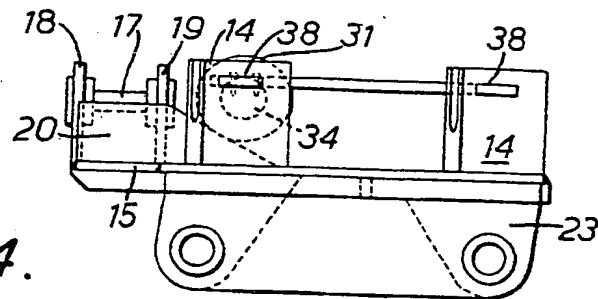


FIG. 4.

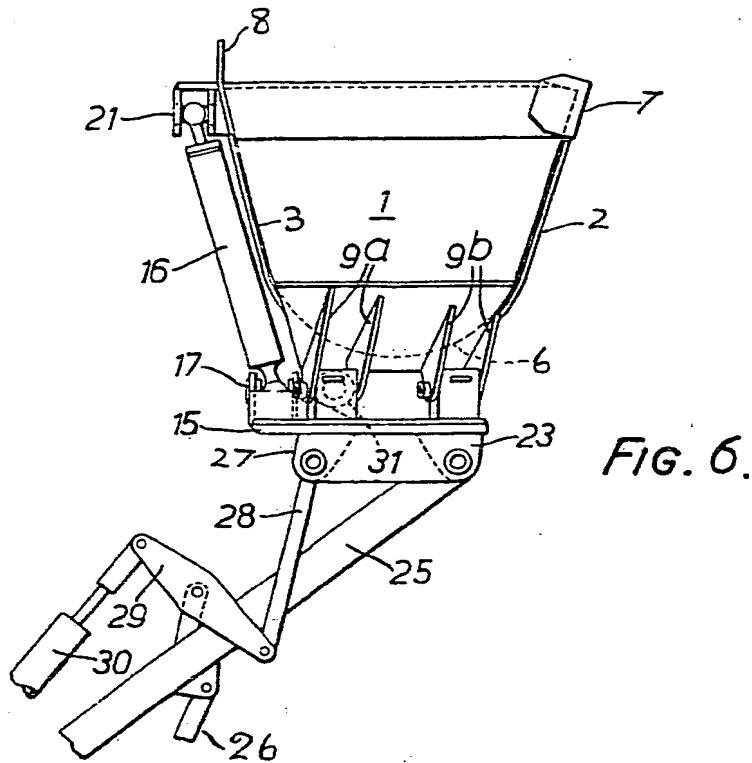
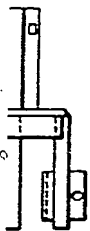
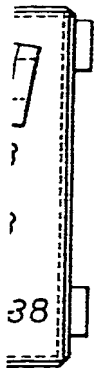
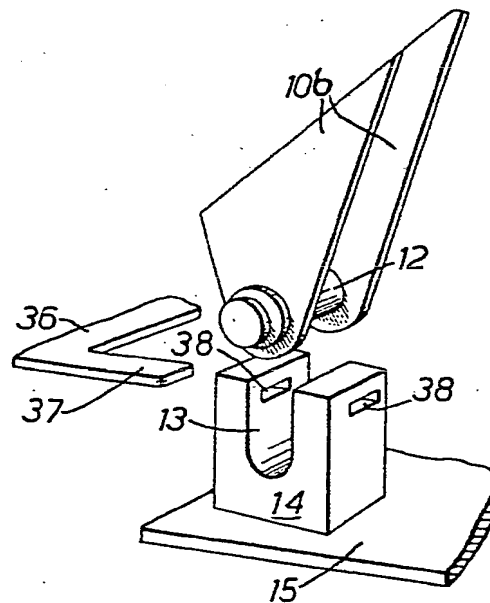


FIG. 7.



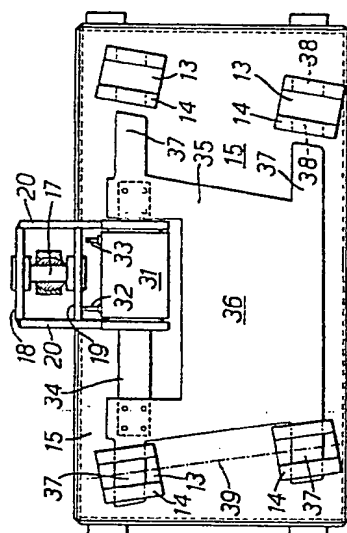


FIG. 2.

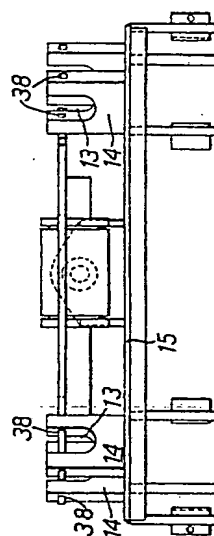


FIG. 3.

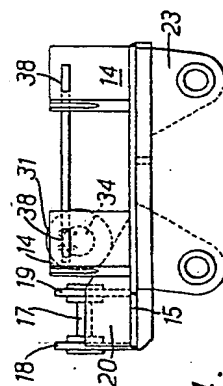


FIG. 4.

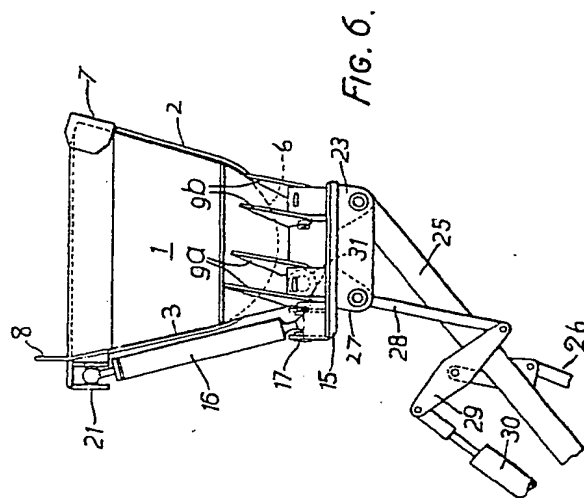


FIG. 6.

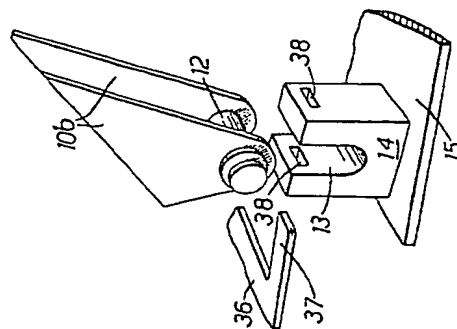


FIG. 7.

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